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ABSTRACT

Because college-bound students often had trouble fitting agricultural education courses into their schedules, and because science teachers rejected the idea of giving a science credit for 2 years of agricultural education, a new integrated course was created in Tennessee. It is now called Science IA (Agriscience). It is taught by a teacher with an endorsement in both agricultural education and science, receives the same funding formula as agricultural education and counts toward a major in agricultural education. The course still includes Future Farmers of America (FFA) units in communication skills and application of knowledge. A long list of steps was needed to get the course accepted as a science credit for college entrance in Tennessee; an outline of these steps is provided. The pilot test of the program was a great success the first year, and student test scores were higher than before implementation of the course. Recommendations were made to strengthen the program as a result of the pilot program. Enrollment figures for the 1991-92 school year indicate a continuing interest in the class. The course has become a model for integrating vocational and academic education. (A list of the units of the course is appended to the report.) (KC)

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Science IA (Agriscience)

A Science Credit for Agriculture: Integrating Academic and Vocational Education

A.A.A.E.

Exchange of Ideas

Los Angeles, CA

December 7, 1991

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Nearly five years ago Tennessee started addressing the problem of how to merge science with vocational agriculture. Due to the extra requirements for college entrance, it was becoming more difficult for many students to pursue agricultural education and take all the necessary college entrance requirements.

Another concern was that many students, for whatever reason, who desired to pursue college were being advised not to take agricultural education. It seemed that something was needed to focus more attention toward agricultural education.

The agricultural education teachers felt that giving credit in science for two years of agricultural education would be a step in the right direction. The two years of agricultural education for one year of science concept was approved by Tennessee state staff in agricultural education including the State of Tennessee Supervisor of Agricultural Education and the Assistant Commissioner of Vocational-Technical Education.

The Commissioner of Education supported the concept (by now it was a formal proposal), but he would not approve the proposal unless all the concerned individuals in General Education were supportive. However, the proposal was then rejected by the State of Tennessee Science Specialists.

A meeting was scheduled with the State Science Specialists that included the Assistant Commissioner of Vocational-Technical Education, the Director of Secondary Programs, the Director of Secondary Vocational Programs, the State Specialists in Agricultural Education, the state FFA Advisors, and the Chairman of the Agriscience Committee.

After an excellent exchange of ideas and concerns, the state science specialists suggested that although two courses in agricultural education for one credit in science was not acceptable, the potential for a new course existed. At this meeting, it was decided that a committee of vocational education and academic education would convene in order to try and develop a new course.

In June 1987, a historic meeting was conducted in Murfreesboro, Tennessee, with the state staff in academic education and vocational education, agricultural education teachers and science teachers. A new science course with the appropriate framework was developed.

The new course was called General Science IA. This title helped to not confuse guidance counselors, college admissions clerks, and registrars. The Agriscience name has been added to the title in the curriculum materials (see attached) so as not to lose the identity with agricultural education or FFA. After a year's pilot of the new course, the recommendation was to drop "General" from the title. The "General", according to the teacher, gave the course a non-college bound "stigma". The course title now is Science IA (Agriscience).

The class has to meet three criteria:

1. It is taught by a teacher with an endorsement in both Agricultural Education and General Science. In 1994, General Science will be dropped and the Science IA teacher must be certified to teach either Biology, Chemistry, or Physics.
2. The course receives the same funding formula as Agricultural Education.
3. The course counts toward a major in Agricultural Education.

The Science IA (Agriscience) course still includes FFA and SAEP in the curriculum. The Committee of Science and Agricultural Education Teachers jointly agreed that the FFA (Communications Skills) and SAEP (Application of Knowledge) were both priorities in the Project Equality publication entitled "Academic Preparation for College: What Students Need to Know and Be Able to Do."

The following is an abbreviation of the steps that followed in getting the course accepted as a science credit for college entrance in Tennessee:

1. Approval by State Science Specialists.
2. Approval by State of Tennessee, Director, Secondary Education.
3. Approval by Assistant Commissioner of Curriculum and Instruction.
4. Approval by Commissioner of Education.
5. Presented to staff of the State Board of Education.
   The executive secretary said that he would present this to the State Board of Education if the State Board of Regents and the University of Tennessee Board of Trustees would accept the class as a science credit for college entrance.
6. Met with University of Tennessee Board of Trustees.
7. Met with Board of Regents.

8. Wrote Science IA Curriculum Guides with assistance from science teachers and state science specialists and sent to designated individuals of each of the two boards.
9. Original rejection by the Board of Regents because not enough physics was included.
10. Science IA Curriculum Guide revised to include more physics.
11. Approval of Board of Regents.
12. Approval by University of Tennessee Board of Trustees pending inclusion of material explaining the electromagnetic spectrum and inclusion of material recommended by the Board of Regents.
13. Changes were made again on the Science IA Curriculum Guide.
14. Approval by University of Tennessee Board of Trustees. The State Board of Education concurred the approval by the Commissioner of Education.
15. The Curriculum Self-Contained Lesson Plans were written by agricultural education and science teachers.
16. Pilot sites for twenty-eight teachers were selected.
17. The course was piloted during the 1988-89 school year.
18. Seven more pilot sites were added the 1989-90 school year.
19. After only two years as a pilot course, Science IA (Agriscience) was so successful that the State Board of Education approved the course as a science course in the Spring of 1990.
20. Approximately thirty-five more schools added the course during the 1990-91 school year.
21. Approximately another thirty-five added the course during the 1991-92 school year. Presently, over 100 schools offer Science IA (Agriscience) in Tennessee.

The Science IA (Agriscience) Pilot Program was great success the first year. Enrollment figures for the 1991-92 school year indicate a continuing interest for this class. Several teachers expressed the need for an additional period/class to meet the student demand. It was recommended that consideration be given of granting four or five pilots a second Science IA (Agriscience) class since this would be a natural progression in the evaluation process of the pilot program.

During the evaluation process at the conclusion of the first year, several recommendations were made for strengthening the course for the next year. They were as follows:

1. The "General" should be dropped from the name of the course. The course should be called Science IA (Agriscience). The consensus of the teachers was that "General" was a "red flag" for guidance counselors for non-college bound students.
2. Controlled Experimentation Sheets, to further enhance the use of the scientific method, should be developed for all applicable units. Recent research documents the effectiveness of hands-on, inquiry oriented science exercises and courses in enhancing higher-level intellectual skills such as critical thinking, problem solving, creativity, and process skills as well as a better understanding of scientific concepts.
3. There was a need for a Science IA/Science Teachers Collaborative Workshop. (This workshop was used to finalize the writing of the Controlled Experimentation Sheets.)
4. The Science IA teacher should play a major role in the recruitment and selection of students into Science IA. Proper screening is essential to insure success.
5. Evaluation by Science/Agriculture State Department personnel should continue.
6. Visitation by State Department of Agricultural Education personnel is important to all pilot program sites.
7. A summary of rules and regulations of Science IA (Agriscience) should be provided to superintendents, supervisors, principals, guidance counselors, science teachers, and Science IA (Agriscience) teachers.
8. Guidance counselors should be invited to the Science IA (Agriscience) meetings to enhance communications.

The high quality of the class is proving good for all, from agricultural education teachers to the Governor of Tennessee. This is

emphasized on the cover of the curriculum. The course is designed for those students considering higher education.

Although thorough evaluation is on-going, there have been many excellent testimonials. However, one of the Science IA (Agriscience) sites in Humphreys County was also a (SREB) Southern Region Educational Board pilot site. A study by Dr. Don E. McNelly, Department of Technological and Adult Education, University of Tennessee, Knoxville, showed that a dramatic increase for Humphreys County students was achieved in the area of science proficiency when compared to their 1988 assessment results. The only group with a higher mean score was in the national sample of academic students. The science proficiency of Humphreys County students was significantly above the SREB goal. Please refer to the Table below for details.

Science Scores: SREB State Vocational Education Consortium Student Assessment Results

AREA	Mean Score
Humphreys County, 1988 (before Science IA)	251.0
Humphreys County, 1990	287.7
SREB, 1990	265.5
National Total	287.1
National Academic	308.1
National Vocational Education	266.7
SREB Goal	280.7

It was felt by the State Department of Education that the course would be relevant, practical, and increase one's interest and appreciation of science. The pleasant surprise is the positive results of the course (curriculum). By integrating science and agriculture so that the relevancy of science is better understood, perceived and appreciated, learning of the science increases. Thus, our course (curriculum) has become a model for integrating vocational and academic education. Units that are especially causing much excitement are the challenge units. Some of these challenge

units (units that do not have to be taught to the whole class but may be given as individualized study)are:

1. Advanced Technologies in Animal Science
2. Advanced Technologies in Plant Science
3. Agriscience in Space
4. Agriscience Alternative Energy Technologies
5. Potential Financial Security toward SAEP.

To borrow from Paul Harvey's "The Rest of the Story", the Agriscience alternative energy projects (Unit 33: Agriscience Alternative Energy Technologies) complete the story. Not only is the Science IA (Agriscience) course (curriculum) a recommended philosophy, the concept is in practice at MTSU. Our work with ethanol, methane, and hydrogen is a testimonial to the potential productivity that can occur when science theory is integrated with vocational applications.

An example of this productivity was being invited to and setting the World's Land Speed Record for a hydrogen fueled vehicle. Present and former Agricultural Education students at MTSU and Agricultural Education teachers entered three hydrogen-fueled vehicles in the World's First Hydrogen Race at the Bonneville Salt Flats in Wendover, Utah this August, 1991. The winner to set the World's record was a vehicle which ran off ethanol and hydrogen. The vehicle was featured in the Science IA (Agriscience) curriculum illustrating the physics of the internal combustion engine.

One could not accomplish the Agriscience alternative energy objectives that we have with scientific knowledge alone. One could not accomplish our objectives with vocational application alone. It involves a merger of cognitive, affective, and psychomotor skills. The Science IA (Agriscience) curriculum emphasizes all three types of learning.

In conclusion, although many people have been included in the change process, let me make it perfectly clear that our present Governor, Ned McWherter, Commissioner of Education, Dr. Charles Smith, and Assistant Commissioner of Vocational-Technical Education, Mr. Marvin Flatt, have created an environment supportive for the revitalization of vocational education in Tennessee.

SCIENCE IA
(AGRISCIENCE)

A course designed to provide those agriscience education students considering higher education with the basic scientific and agricultural knowledge and experiences which focus on biological, environmental, chemical, and physical sciences and leadership and personal development skills.

State of Tennessee
Department of Education
Division of Vocational-Technical Education

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* Challenge Units